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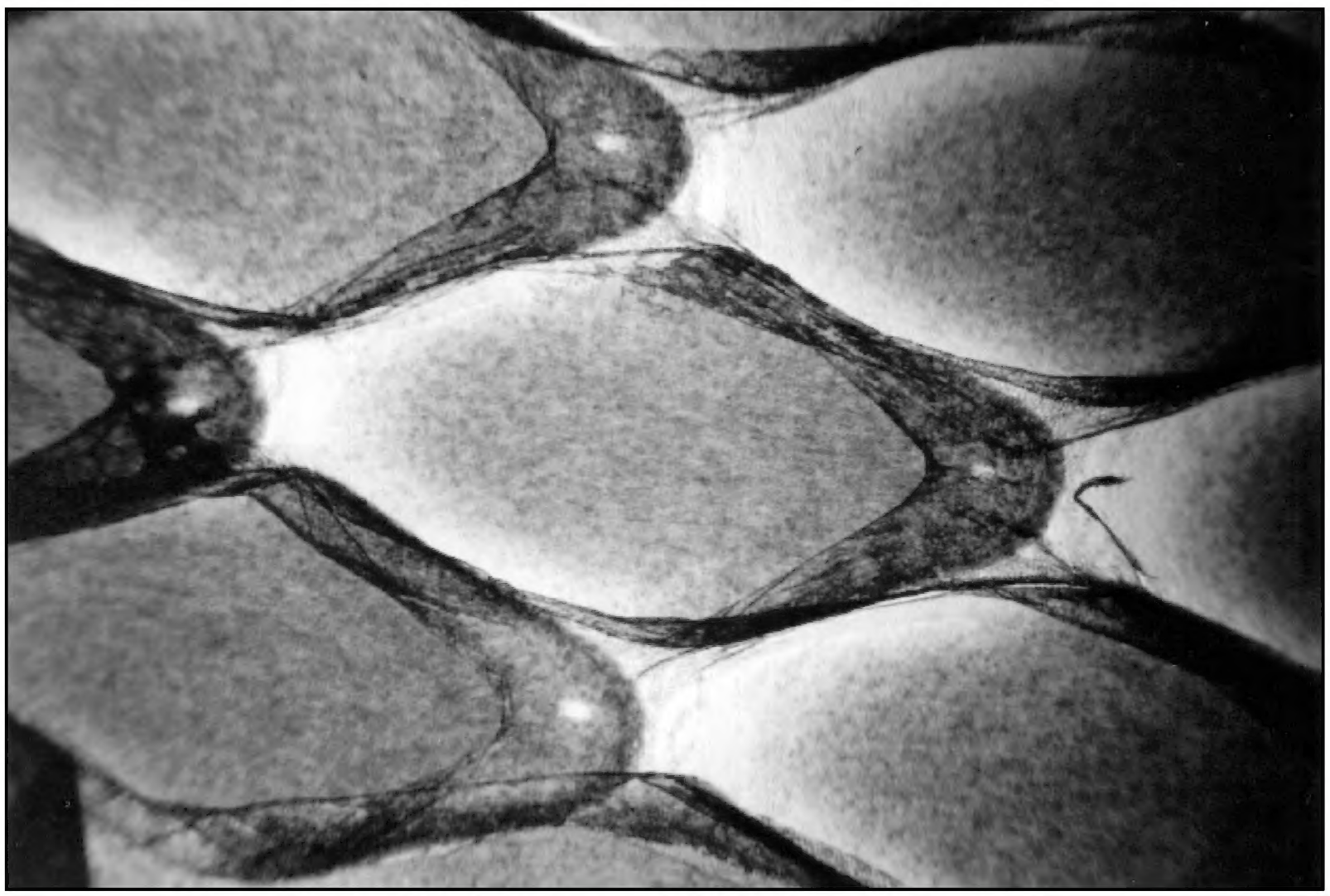

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A Study of Apical Pits Using Shed Snakeskins

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Introduction

Apical pits are translucent epidermal spots located on the posterior end (the apex) of the dorsal scales of some snake species (Gloyd and Conant, 1990). In the majority of species with these structures, the dermis in the region of an apical pit is densely pigmented with melanin, while the corresponding region of the epidermis is not pigmented. This difference in pigmentation between the dermis and epidermis causes the apical pits to appear pigmented in the actual animal, but not pigmented in the shed stratum corneum (Figure 1). These structures may be single (e.g., *Carphophis* spp., *Diadophis* spp.) or paired (e.g., *Nerodia* spp., *Regina* spp.). The location of the dorsal scale pits varies among genera. For example, they occur within the apical lobe (see Figure 2) in *Lampropeltis* and *Pantherophis*; they are found at the base of the lobe in *Nerodia* and *Regina*; they are found well beyond the lobe in some species of *Agkistrodon*. Apical pits usually are found on dorsal scales of the nape, midbody and tail. However, these structures may be restricted to certain regions of the body, such as the nape in *Storeria* (Gray, 2002), or just the nape and tail as in some species of *Thamnophis*. Some genera appear to lack apical pits (e.g., *Farancia* and *Virginia*).

The function of apical pits remains ambiguous. Proposed functions range from aiding in ecdysis; serving as a site for the release of sex-specific hormones; to serving as detectors of thermal variations (see Ball [1996] for a review). Hobart Smith (pers. com., 2005) has suggested that they may be associated with sensory nerve endings and serve a tactile function. Marx and Rabb (1972) considered the absence of apical pits a derived character. Prior studies of apical pits have used actual snakes to determine the presence of these structures. It has been noted, however, that apical pits are more easily observed in shed skins than in the actual specimen (Gloyd and Conant, 1990; Gray, 2002). The purpose of this investigation was to determine whether apical pits could be observed in the shed skins of 32 North American snake species, and compare these results with reports of apical pits in the literature.

Materials and methods

Shed snakeskins (n = 279) of 21 genera, representing 32 species of North American snakes were used in this study. Shed skins were found in the field or obtained from specimens kept in captivity. Only shed skins containing material for cephalic, midbody and tail sections were used. Sections of these shed skins were cut, spread and pressed as described in Gray (2006). Sections of the shed skins were moistened with 70% isopropyl alcohol, spread on wax paper, blotted dry, then placed in a plant press for 24 hours. After being pressed and dried, the sections were examined with a stereo microscope at 10 – 30× magnification, and with a combination of incident fluorescent and transmitted fluorescent illumination. Apical pits were recorded as present if observed in at least two scales of a mounted section (i.e., cephalic, midbody or tail). The following sources were consulted to establish baseline data regarding the presence or absence of apical pits in the 21 genera of snakes under consideration: Cope, 1892, 1900; Dunn, 1928; McCauley, 1945; Wright and Wright, 1957; Ernst and Ernst, 2003. The data from these sources was compared with the results of the shed skin investigation.

Results and discussion

The above-mentioned literature sources revealed that 15 of the 21 genera were reported to have apical pits, while four genera consistently lack them. Both *Carphophis* and *Thamnophis* produced contradictory reports, with some sources reporting presence of pits, while others reported that they were absent. Comparison of the literature reports with my shed skin data revealed additional conflicting results in *Clonophis* (apical pits not observed in sheds) and *Storeria* (apical pits present in some sheds) (Table 1).

Table 2 lists the 32 species included in this study, and

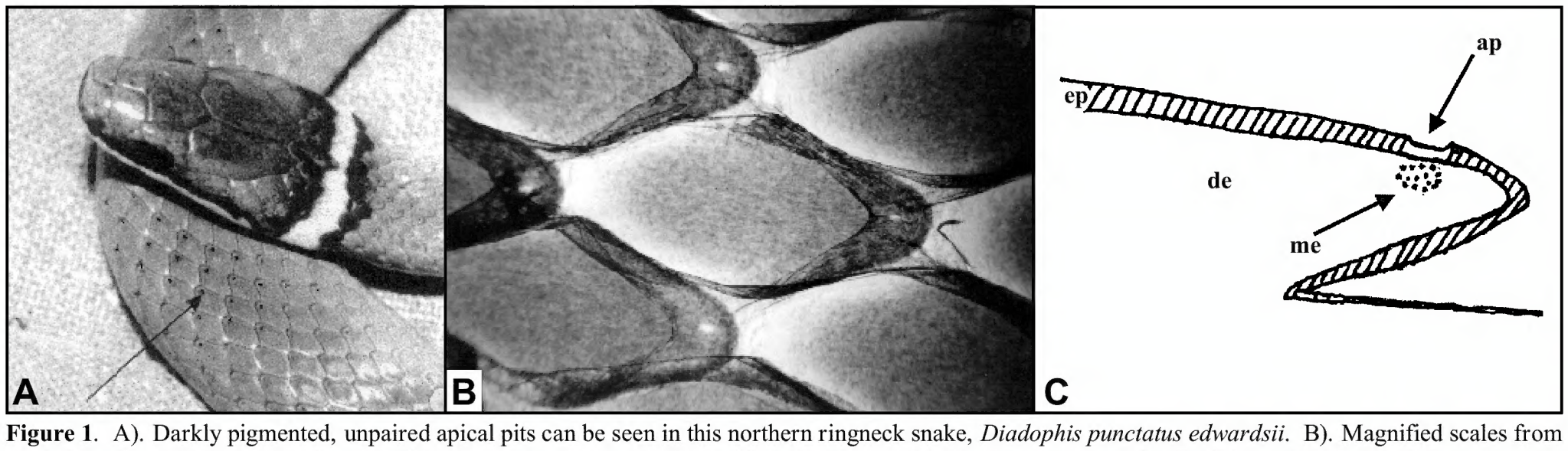

Figure 1. A). Darkly pigmented, unpaired apical pits can be seen in this northern ringneck snake, *Diadophis punctatus edwardsii*. B). Magnified scales from shed skin of a northern ringneck snake, *Diadophis punctatus edwardsii*. Note that the apical pits are unpigmented. C). Schematic representation of typical pigmentation in epidermis (stratum corneum) and dermis; cross-section of scale. **ap** = apical pit; **de** = dermis; **ep** = epidermis; **me** = concentration of melanin.

Table 1. Presence or absence of apical pits in snake genera as reported in selected literature sources and compared with the present study. A plus sign (+) represents that apical pits are reported present, a minus sign (–) indicates absence, and n/r represents no mention in the source as to presence or absence of apical scale pits.

Genus	Source					
	A	**B**	**C**	**D**	**E**	**F**
Agkistrodon	+	n/r	+	+	+	+
Crotalus	n/r	n/r	+	+	+	+
Sistrurus	n/r	n/r	n/r	+	n/r	+
Carphophis	+ [1]	–	+	–	–	+
Clonophis	+	+	n/r	+	+	–
Coluber	+	+	+	+	+	+
Diadophis	+	+	+	+	+	+
Farancia	n/r	–	n/r	–	–	–
Heterodon	+	+	+	+	+	+
Lampropeltis	+	+	+	+	+	+
Liochlorophis	+	+	+	n/r	+	+
Masticophis	+ [1]	n/r	n/r	+	+	+
Nerodia	+	+	+	+	+	+
Opheodrys	+	+	+	n/r	+	+
Pantherophis	+	+	+	+	+	+
Pituophis	+	+	+	+	+	+
Regina	+	+	+	+	+	+
Storeria	n/r	–	–	–	–	+
Tantilla	n/r	–	n/r	–	–	–
Thamnophis	–	–	+	–	+ *	+
Virginia	n/r	–	–	n/r	–	–

Sources: **A**) [1]Cope, 1892; Cope, 1900; **B**) Dunn, 1928; **C**) McCauley, 1945; **D**) Wright and Wright, 1957; **E**) Ernst and Ernst, 2003; **F**) This study.
* Indicates that some species in the genus are reported to have apical pits, while others lack them.

reports the percentage of sheds that had observable apical pits, and the body regions where they were observed. Twenty-five species (78%) had observable apical pits, of which 13 (52%) had pits observed in all sheds examined, whereas 12 species (48%) had them in some sheds but not others. Of the seven species for which apical pits were not observed, one species, *Clonophis kirtlandii*, had been previously reported to have apical pits (Table 1). Apical pits were restricted to the nape in three species (9%); found on the nape and midbody in seven species (22%); and observed on just the midbody section of two species (6%). Thirteen species (41%) had apical pits observed on all three sections (cephalic, midbody, and tail) (Table 2).

Both Cope (1892) and McCauley (1945) report unpaired (single) apical pits in *Carphophis*, while other sources (Dunn, 1928; Wright and Wright, 1957; Ernst and Ernst, 2003) reported pits as lacking in this genus. In my study, four of the six (67%) wormsnake (*C. amoenus*) sheds examined had unpaired apical pits on dorsal scales of the nape and body. Apical pits are difficult to observe in individuals (especially small specimens) of this species. Indeed, I was unable to observe apical pits in a captive specimen, despite the fact that the structures were observed in shed skins from this same snake.

Apical pits are more difficult to discern in juveniles of some species as well. For example, samples from *Lampropeltis triangulum* and *Nerodia sipedon* each contained a single shed that appeared to lack apical pits. Both these sheds were from juvenile specimens. Perhaps higher magnification (> 50×) would have revealed the presence of these structures.

Intraspecific and interspecific variation may explain the conflicting reports in the literature regarding apical pits in the genus *Thamnophis*. In the present study, only 31 (49%) of the 63 *T. sirtalis* sheds had visible apical pits; all three *T. sauritus* sheds had pits; while all *T. brachystoma* (n = 18) and *T. radix* (n= 1) sheds lacked apical pits. Ernst and Ernst (2003) report apical pits to be absent in *T. sauritus*, which raises the possibility that some individuals of this species may lack pits. In individuals of *Thamnophis* with pits, the pigmentation in the dermis and epidermis is typical, with apical pits being unpigmented in the sheds (Figure 3), but dark in the actual animal. Desroches and Rodrique (2004, p. 211) provide a photograph of a northern ribbon snake with dark apical pits visible on scales of the lateral line just beyond the nape.

As I noted in an earlier paper (Gray, 2002), apical pits may

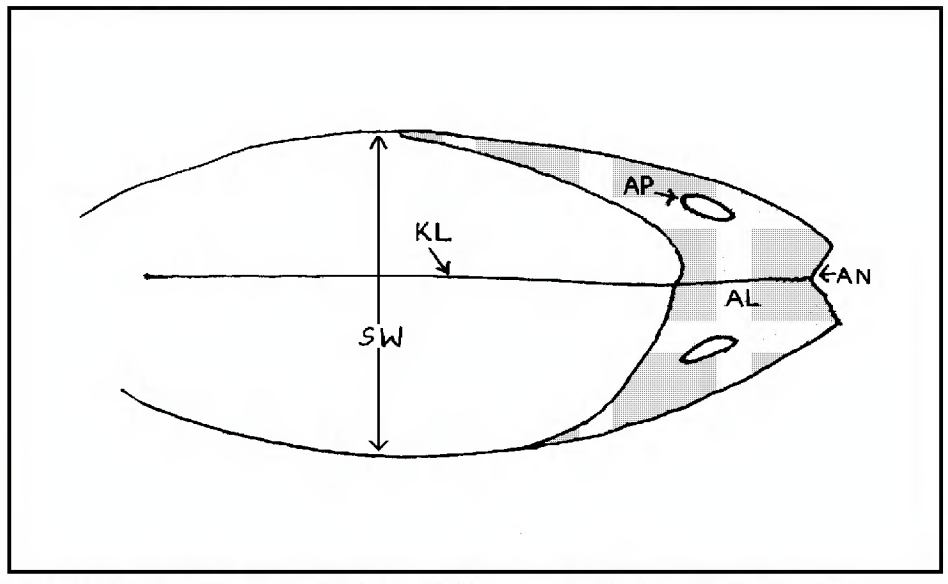

Figure 2. Scale nomenclature: AL = apical lobe (shaded); AN = apical notch; AP = apical pit; KL = keel; SW = scale width.

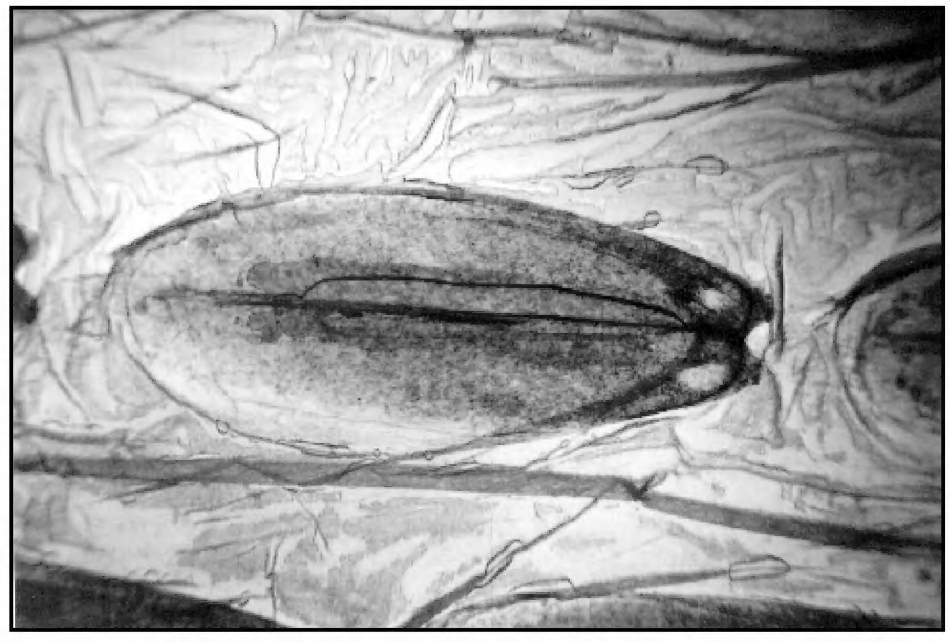

Figure 3. Unpigmented, paired apical pits as seen on the shed skin of a northern ribbon snake, *Thamnophis sauritus septentrionalis*.

Table 2. Species examined during the course of the present study. Body regions: A= all (i.e., cephalic, midbody and tail); M = midbody; N = nape.

Species	Number of sheds examined	Number of sheds with apical pits	Body region(s) with pits	Percentage of sheds with pits
Agkistrodon contortrix	4	4	A	100%
A. piscivorus	1	1	A	100%
Crotalus horridus	5	3	N, M	60%
Sistrurus catenatus	5	3	N, M	60%
Carphophis amoenus	6	4	N, M	67%
Clonophis kirtlandii	5	0	–	0%
Coluber constrictor	3	2	M	67%
Diadophis punctatus	24	24	N, M	100%
Farancia abacura	1	0	–	0%
Heterodon platirhinos	1	1	N, M	100%
Lampropeltis calligaster	1	1	A	100%
L. getula	3	3	A	100%
L. triangulum	21	20	A	95%
Liochlorophis vernalis	8	2	N	25%
Masticophis flagellum	2	2	A	100%
Nerodia erythrogaster	1	1	N, M	100%
N. sipedon	20	19	A	95%
Opheodrys aestivus	6	1	M	17%
Pantherophis guttata	4	4	A	100%
P. obsoleta	12	12	A	100%
P. vulpina	2	2	A	100%
Pituophis melanoleucus	3	3	A	100%
Regina septemvittata	6	3	A	50%
Storeria dekayi	26	8	N	31%
S. occipitomaculata	16	5	N	31%
Tantilla coronata	1	0	–	0%
Thamnophis brachystoma	18	0	–	0%
T. radix	1	0	–	0%
T. sauritus	3	3	N, M	100%
T. sirtalis	63	31	A	49%
Virginia pulchra	6	0	–	0%
V. valeriae	1	0	–	0%
Totals	**279**	**162**		**58%**

be difficult to observe in specimens of the genus *Storeria* (and possibly others) if, instead of being darker, the dermis below the pits is pigmented the same as the surrounding ground color. This condition causes the unpigmented region of the epidermis containing the apical pits to be masked from below. Therefore, apical pits are more easily detected in shed skins.

Several factors may affect the ease with which apical pits are observed in snakes or their shed stratum corneum. For example, in preserved specimens, the preservatives used (e.g., formalin or alcohol) may make these structures more difficult to observe than they would normally be in a living snake. To better observe apical pits in preserved specimens, Campbell and Lamar (2004) suggest removing the outer layer of epidermis from individual scales, drying, then examining under magnification. The laminating process used to preserve a shed section may also make these structures more difficult to discern. The magnification of the microscope, as well as the

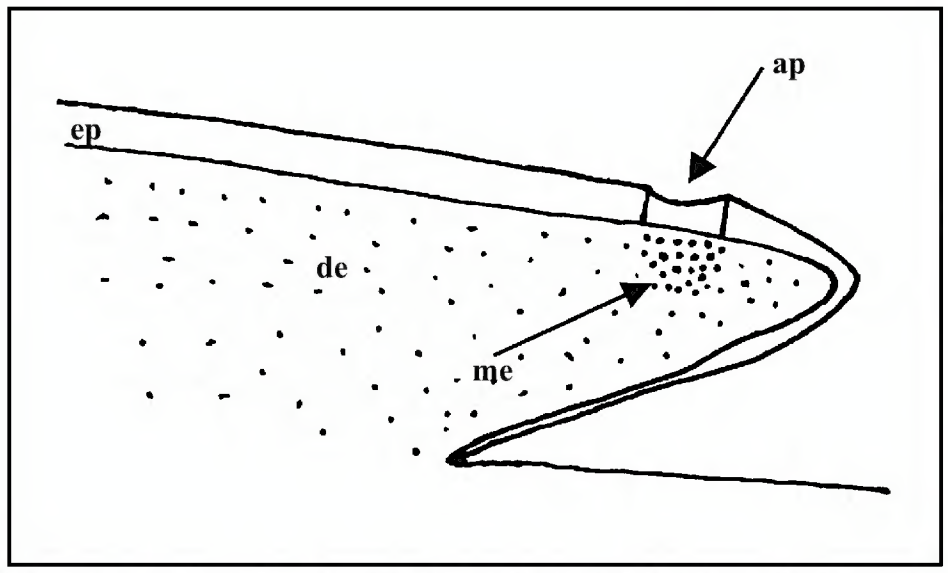

Figure 4. Schematic representation of pigmentation in epidermis and dermis (cross section of scale) of Kirtland's snake, *Clonophis kirtlandii*. The nearly complete absence of melanin in the stratum corneum makes apical pits difficult to discern in the shed skins of this species. Abbreviations as in Figure 1C.

angle and type of illumination utilized can determine whether or not apical pits will be observable. In the *Crotalus horridus* sheds examined during this study, apical pits were very difficult to make out at 10× magnification. However, at the higher magnification (30×), this difficulty was eliminated. Presence or absence of melanin deposited in the region of the apical pits may also affect detectability. As noted above, in the shed skins (stratum corneum) of most species, the region where the pits occur is not pigmented, whereas the surrounding area is densely pigmented with melanin. In the case of Kirtland's snake, however, the stratum corneum has relatively little melanin deposited in it, thus making it more difficult to discern the apical pits (Figure 4). The results of this investigation suggest that subsequent studies of apical pits examine both sheds and actual specimens to determine whether or not these structures are present.

Additional research is needed in determining the genetic factors governing the presence or absence of apical pits. More research is also needed to determine their function.

Acknowledgments

I thank Hobart Smith for directing my attention to and providing me with a copy of Dunn's key, and for offering comments and suggestions on the manuscript. I would also like to express my appreciation to Mark Lethaby and Jim Ball for reviewing the manuscript. Thanks also to Joe Collins for suggestions that improved the manuscript. The following individuals provided shed snake skins: Grover Barfield, Jeff Beane, Bill Black, Scott Bloomstine, Ken Brunson, Larry Cartmill, Joe Collins, Paul Curtis, Barbara Farron, William Gates, Chris Grassl, Jim Harding, Mark Lethaby, John Orr, Kyle Study, and Brian Wettekin.

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Herping in Australia—Field Notes and More
Part 13: Herps from Melbourne's Southeast Fringe

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The Mornington Peninsula

Rob Valentic is one of the characters on the Victorian herpetology scene. At the time of writing this article in 2002 he's known as one of the best reptile photographers around.

I first met him in the early 1990s as I was walking in Spring Street, Melbourne, just outside that seat of democratic fascism known as the "Melbourne Parliament House." I was accosted by this young man with a punk hairdo who thrust a copy of my own (1989) book *Australian Reptiles and Frogs* into my face.

"Sign it," he demanded. That was one of his trademarks. Rob doesn't ask for things; he demands them. Having gone through the formalities of introductions and signing, he turned to me and said "Look, my mum here won't let me keep venomous snakes. Tell her to let me."

I looked at the woman who was obviously the mother, and before I could speak she was justifying herself: "Look, I have to put my foot down somewhere. Rob's got lots of reptiles. He's even got a huge-great scrub python, and er, well, I'm scared of them and I don't want my son to get bitten. I've just got to put my foot down!"

Rob continued, "Tell her it's OK, tell her it's OK"
I turned to the mother and said: "I think you are in the right. You have to put your foot down and tell Rob as it is. No venomous snakes. No black snakes, no brown snakes, no taipans." After a brief pause I continued: "But death adders are fine. Fill your house up with the things!"

A few years later I met up with Rob again at a meeting of the Victorian Herpetological Society (VHS). He demanded I see his snakes at his Greensborough home. I went there and all he had was death adders and lots of them. He had nothing else. His mum was tolerating them under duress and slowly getting used to them.

And as it turned out, due to our mutual interest in these and other reptiles, we did a bit of herping together in the mid to late 1990s. What greater experience I had in terms of herping over the previous 20 years, Rob more than made up for with his enthusiasm and local knowledge, neither of which I could match.

And so for a while there we worked as a good duo, enhancing one another's knowledge and appreciation of herps. Rob became a keen herp photographer and set about the enormous task of getting photos of every reptile and frog from around Australia. Now with over 1,000 species that's no easy feat. But Rob was helped in his task by the fact that he had rich parents and so never seemed to have to worry too much about things like money.

Instead his life became almost one long continuous holiday whereby he traveled the Australian countryside collecting reptiles and frogs and photographing them. Having myself photographed many Australian species, I knew the quest he was on and how things would pan out.

Getting photos of the "big things" like snakes, monitors and the like is actually fairly easy. If you can't find them in the wild yourself, invariably there is a collector somewhere with a few as pets. So within a short time frame you have photos of all these species.

Moving down the "reptile-scale" to critters like small skinks, the picture changes radically. Hardly anyone has an interest in them. Most so-called herpers don't know one from the next and even fewer people have them in cages at home. And so the only way to find these animals to photograph is to go out and capture them yourself.

Also it's worth noting that the vast majority of reptile species in Australia are nondescript—small skinks, small brown frogs and the like. One of these small, obscure species that Rob wanted to get photos of was the swamp skink (*Egernia coventryi*). This is a medium sized skink growing to about 20 cm in length, restricted to paperbark (*Melaleuca* sp.) swamps, brackish watercourses and similar places in southern Victoria and immediately adjacent coastal areas.

The local wildlife department has the species listed as "rare" or "endangered," thereby heightening the significance of the species in terms of Rob wanting to have photos of it. As it happened, I didn't have photos of the species either and so Rob was able to convince me to take a drive with him down to the Mornington Peninsula in search of them.

For those who don't know, the Mornington Peninsula is the area to the southeast of Melbourne. At its nearest parts such as Frankston and Mount Martha, the area is effectively the far southeastern suburbs of Melbourne. Beyond that the area forms a large squarish peninsula extending about another 40 km south of these suburbs to cover a largely rural area dotted on the edges with small seaside towns that take in holiday houses for Melbournians and retirees.

On the west side is the Port Phillip Bay, that extends up to the Melbourne city. To the south is the ocean, or perhaps more accurately the watermass known as "Bass Strait," the coastline of which includes some famous surf beaches, while to the east side is the Western Port Bay. And yes, to the north is more of the Victorian landmass, including Melbourne's outer eastern suburbs.

Before embarking on our trip to the Mornington Peninsula in search of these swamp skinks, I wanted to do my research

on the species. While some herpers will take a hit and miss approach when searching for an unfamiliar species of reptile, I am different in that I like to do my homework first. Experience has shown me that by doing this, my chances of success in finding the species are then far greater. Put simply, you are less likely to waste a trip.

We read the various papers on the species as prepared by Mike Taylor, Peter Rawlinson and others. On the basis of what we read we decided that the species had a preferred habitat of the thick and largely inpenetrable *Melaleuca* swamps and that we had next to no chance of finding any under cover. We concluded that it would have to be a hunt undertaken during the warmer months of the year when we'd be able to find some lizards out in the open.

The date of this excursion turned out to be 17 October 1995. As we left my house in the Melbourne suburb of Doncaster, the weather was seasonably warm and sunny. The forecast was for a warm and sunny day. Our destination was to be Tootgarook Swamp area—Melways reference map 169, F7, Lat. 38°23′S, Long. 144°52′E. The area is adjacent to an area known as Trueman's Road Recreational Reserve.

Driving off on a herp hunting trip always has that great feeling of anticipation. Especially if it's going after an unfamiliar species. It's hard to explain to a nonherper, but I assume that most people reading this are herpers and they'll know exactly what I mean.

As we drove down the freeway past Frankston and on to the Mornington Peninsula, we had to stop to urinate by the side of the road. Here in Australia that's a jailable offense, but people still do it anyway. We stopped at a bridge crossing a creek and couldn't help but wander around for a few minutes to take a look at what was there. Amongst the fallen trees and vegetation we saw lots and lots of small skinks (*Lampropholis delicata*).

The air was warming up, the clouds were high and you could just sense the air pressure falling. All of this was the perfect recipe for reptiles and lots of them! After our short break we headed on for our final destination. We got to Tootgarook Swamp at about 12:30 P.M. (just after noon).

We hadn't known exactly what to expect, but it wasn't exactly to our liking. Besides a mass of trees growing in a swamp and thick undergrowth nearly a meter thick, we couldn't see much of anything. To make things worse a front had just crossed the area and there was a cold southerly wind blowing.

What was that I'd once said about the changeability of Melbourne's weather? Unbeknown to us, the front never got to Melbourne during that day, making the forecast for the city of a fine and hot day accurate. The air temperature at our earlier pit-stop had been a calm 20°C and rising. Now we were faced with a cool 15° and little prospect of much better.

Mike Taylor's papers (Taylor, 1994, 1995) had up until this stage been our "how to" manual for finding the species. It had told us exactly where to go and where the skinks lived. Noting that the habitat didn't seem to offer us any easy breaks in terms of finding the skinks, we drove around the adjacent areas to see what else we could find.

Rob demanded we go into the swamp and start snooping around. To me this was even worse than rainforest hunting. The vegetation was just so thick and the lack of ground cover in the form of logs or rocks (both of which were totally absent) made hunting for rainforest herps look positively easy. This was worse than looking for a needle in a haystack.

Rob started to snoop around the edges of the swamp. I decided to follow my better instincts and headed for an adjacent rubbish tip, located between the swamp and the Tootgarook housing estate. Within minutes I'd kicked over a small piece of concrete immediately adjacent to a drainage ditch and caught the first *Egernia coventryi* for the day.

Rob then gave up on his attempting to spot skinks in the swamp and we walked along the road to the tip together in search of more herps. Heading east along Hiscock Road we soon found five garden skinks (*Lampropholis delicata*) under more man-made debris in a grassy area adjacent to the road. Under a sheet of embedded tin in a grassy paddock area, I found a metallic cool-skink (*Pseudemoia metallica*). It was an adult gravid female.

The name "Cool Skink" I think was coined by Ehmann (1992) to describe species from colder climates. It's probably appropriate. Meanwhile Rob wanted to go back and look in the swamp for more swamp skinks. I think he wanted to prove a point that this was still the best place to look for the lizards. I wasn't too concerned by this stage as we had our lizard to photograph and so we returned to the swamp and its margins in search of reptiles.

The sun was starting to appear between the fast-moving low clouds flying overhead. This was very much a blessing for us as our following success was to show. Within minutes Rob said he saw two adult swampland cool-skinks (*Pseudemoia rawlinsoni*), although I was unable to see them. These are another of these smaller nondescript species of which there are dozens of similar species here in Australia.

He said they were basking on grass swards above ground level at edge of dense *Melaleuca* thickets bordering the swamp. Still at the edge of the swamp Rob soon found an adult blotched bluetongue (*Tiliqua nigrolutea*) basking in grasses at the edge of the swamp. We took a close look at the lizard and saw it had two ticks in one ear. Ticks in ears are common for bluetongues all over Australia. However it had no mites visible, which was something else we were mindful of and looking out for.

Victorian blotched bluetongues are not like their so-called "Alpine" counterparts from the central highlands of New South Wales in areas near and west of Sydney. Victorian ones are not the bright pink and black color on top. Instead they are much duller and some specimens are almost a plain greyish color. Glen Shea investigated these differences, but found the color trait to vary in a cline through the southern highlands of New South Wales and adjacent areas and hence the retention of the view that all are of the same species.

Meanwhile Rob was on a bit of a roll and he soon grabbed a large greenish adult white-lipped snake (*Drysdalia coronoides*) from amongst some dense grass swards at the edge of the swamp, adjacent to yet more dense *Melaleuca* thickets. Rob is one of those herpers who is blessed with good eyes and he is better than most when it comes to seeing cryptically colored reptiles moving about in their habitat.

Shortly thereafter the pair of us located a large adult eastern bluetongue (*Tiliqua scincoides*). It was active at the edge of the swamp. I was surprised that the two species of bluetongue were sympatric, as I'd never seen this in a single locality in New South Wales. However I've since seen this in many areas of east and southeast Victoria, including around Park Orchards, Wonga Park and Powelltown.

This lizard we'd just found evidently had lots of mites as indicated by white droppings and ticks in the ears and elsewhere. A close inspection revealed mites under the scales which were also raised, under the vent, and the other places that mites tend to be found.

For a herper used to looking around places like Sydney all this was of interest. You see, notwithstanding the time of year (mid-spring) the reptiles were all being active at temperatures considered way too cold for most reptiles around Sydney.

Our general success in finding reptiles continued. I soon found an olive-colored adult male white-lipped snake basking in a tight coil in a grass tussock. The snake was due to slough as indicated by its opaque eyes and also carried some small to medium ticks on it.

Not to be outdone, Rob soon grabbed a reddish-brown white-lipped snake that was moving near a grass tussock at the edge of the swamp. This was a gravid female. The species has live young, which is the normal situation for most cold climate species and all Melbourne snakes except the eastern brown snake (*Pseudonaja textilis*), which is an uncommon species on the Mornington Peninsula.

All the above were found in about 60 minutes, but the swamp and its margins failed to yield any more swamp skinks. And so we were back to Hiscock Road, the drainage ditch and the rubbish tip in search of our lizards. Rummaging around the ditch and the rubbish dumped within it, Rob and I caught another three swamp skinks within an hour. Besides that we found yet another white-lipped snake and two more *Lampropholis delicata* skinks. All this in just under 50 minutes.

By this stage there were storm clouds gathering overhead and ten minutes later the heavens opened on us. Fortunately, by then we were back in our car.

But How Rare Are They?

Rob Valentic, myself and others have formed the view that the species seems to be almost stapled to *Melaleuca* swamps and their immediate environs. That's notwithstanding the migration of specimens to other locally available haunts like rubbish tips as seen so graphically at Tootgarook. In a 1992 internal DNR Report (not cited here) herpetologist Peter Robertson stated that there were only nine locality records for Victoria for *Egernia coventryi*. Rawlinson (1971) cited six known Victorian localities as Ballarat area, Warnambool area, Rosedale area, Mallacoota area, Kentbruck area and Boneo area. A booklet titled *Threatened Fauna in Victoria—1995* (DNR, 1995) lists *E. coventryi* as "rare" according to a formula that is not strictly in line with that used by the IUCN. Other relevant publications include: Cogger et al. (1993), Ehmann et al. (1992), Gillespie (1992) and Watson et al. (1991).

However, notwithstanding the above, my own enquiries reveal a somewhat different picture. Without having gone out of my way to find them, the species has turned up in a number of previously unrecorded localities in Victoria, including in swamps and paddocks near Worri Yallock.

Swamp skinks have also turned up along a number of brackish streams and stormwater drainages running into both sides of Port Phillip Bay, including in the heavily built up areas of Seaford and Dromana. Put simply the species is fairly nondescript and smallish and hardly likely to come to the attention of nonherpers. For that matter, it'd be rare for a nonherper to be able to identify the species, even if they trod on one!

As for herpers around Melbourne, the species is little different to the "feed-skinks" found in most non-urbanized areas and again unlikely to be sought after. And if caught, highly unlikely to be recorded anywhere and even less likely to end up lodged in the local museum.

Add to that the preferred habits of the species and the general inaccessibility of their habitat to people who may be inclined to make generalized searches for reptiles, my guess is that the species is probably widespead and common in most coastal areas of Victoria where suitable habitat occurs. This is particularly so, bearing in mind that the Tootgarook population at least didn't show any hesitation to be invasive enough to try out new areas to live as the opportunities arose. Taylor's own studies showed the species to be territorial and thus weaker specimens were as a matter of course forced from their preferred areas. This may also have inadvertently aided the dispersal of the species to many other areas of suitable habitat, including locations as yet unrecorded.

To be continued

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Book Review: *Headless Males Make Great Lovers & Other Unusual Natural Histories* by Marty Crump. 2005. 199 pp. University of Chicago Press. ISBN 0-226-12199-2. Clothbound. $25.00

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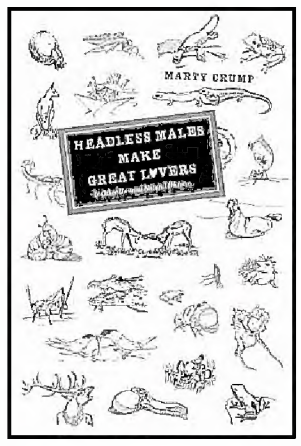

Not since reading Lorenz (1952, 1963), Tinbergen (1958, 1960) and Eibl-Eibesfeldt (1970) have we been so captivated by a book on ethology. The author has provided a most interesting book, covering varied and highly enlightening aspects of animal behavior, with special emphasis on amphibians and reptiles. This book presents some of the strangest phenomena ever compiled into a single volume.

The title is intentionally somewhat misleading, but an ethologist knows that it reflects the behavior of a male praying mantis, which, attracted by the smell of a female hidden in the foliage, creeps up behind his potential mate. He leaps, and with luck he secures a perfect grip on her body, and copulates. If by chance he misses or is off on his grip, the female will most likely bite off his head. The female instinctively knows that a headless male makes a great lover, because the copulatory movements in mantids are controlled by masses of nerve tissues in the abdomen rather than the brain, and males mate more effectively, and repeatedly, when decapitated. The female black widow spider is another creature which frequently kills its partner unless the male can escape extremely fast. Does this indicate how ruthless a woman can be?

Anyone interested in herpetology should relish reading the chapter on parental behavior ("The Mamas and the Papas"). The female strawberry poison dart frog (*Dendrobates pumilio*) lays her eggs on damp leaves, and once the tiny black tadpoles hatch they wiggle onto their mother's back and she carries them to water caught between leaves of bromeliads to complete metamorphosis. Other examples covered include the hellbender (*Cryptobranchus alleganiensis*) and the waterdog or mudpuppy (*Necturus* sp.), which oxygenate their eggs and young, and the male Japanese giant salamander (*Andrias japonicus*), which may guard its eggs for up to 50 days.

Examples of parental care are also drawn from the Reptilia in in the form of several species of pythons and the American alligator. Other examples discussed include species of fish, scorpions, spiders, giant water beetles, numerous birds, and of course mammals, all of which nurse their young. The red kangaroo of Australia cares for its offspring for well over a year, and the female is capable of providing two different kinds of milk for her nursing babies. The offspring attached to the teat in the pouch receives low-fat milk, whereas the active "teenager" gets higher-fat milk.

Chapter three will prove extremely interesting and captivate the minds of the majority of people who feel that all insects are nothing but disease-spreading, worthless creatures. Surely such thoughts will change after reading the author's authoritative and highly interesting essay on dung beetles which, she says, "are worth their weight in gold—or at least in green feldspar and obsidian." These insects are doing mankind a great service in sanitizing the earth when they bury chunks of dung and use it for their favorite food. After the introduction of cattle, Australia was faced with a problem in lacking dung beetles to clean up the cow pies. This provided a massive breeding ground for flies, which in turn were detrimental to human health. Therefore in 1993 Australia imported dung beetles from Africa. This has proved to be one of the few suc-

cessful intentional animal introductions.

Vampire bats are another group covered. Many people feel that all bats are vampires, probably due to the influence of the Dracula movies. But the majority are insectivorous, frugivorous, or even flower-eating, feeding mainly on pollen and nectar and occasional insects found within the flower. A few species are fish-eating. The true vampires consists of only three small species. The major concerns regarding these species are the possibility of human contraction of virus-caused diseases, such as rabies, or secondary infection of the wound.

Marty Crump provides the reader with extraordinary stories of curious creatures and amazing behaviors. She is a skilled storyteller and shares her enthusiasm for the unusual. Each chapter begins with the intriguing and then moves to the bizarre, ending with the most spectacular examples of animal lore.

We hope that her stories will inspire many to pursue studies of natural history and behavior.

This book has been made readily available to the layperson by its low cost, and anyone having purchased or read this book will certainly want to read it over and over again.

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HerPET-POURRI

by Ellin Beltz

A minute to learn

Even before my frog book came out, I got amazingly cute letters from people. This gentleman was one of the more memorable, sending photos of the Green Frogs in his garden and notes in a sprightly and visual writing style. His latest describes an amazing observation that someone, somewhere might like to study. It's a lot of brainpower for such a small skull. "I am not sure if you remember me, but I am the person who wrote you last year about the frogs in my water garden responding to my cue; tapping a stick on the patio stones, and having them hop out to get their daily ration of a worm. Just thought you might be interested in what happened today. We have had a stretch of warm weather here in New York, and the frogs began appearing about a week ago, after their long winter sleep. This afternoon I was working by the water garden, and suddenly saw this frog swim across the pond and hop out on a rock on the side of the pond, looking at me. I thought `you don't suppose...,' so I went to the garden, dug a worm, found my stick, and went to the patio by the pond. I tapped a couple of times, and he came hopping out on to the patio, looking up at me expectantly. I put the worm down on the stones, and he gobbled it up, as if he had done this just yesterday. I was amazed—a whole winter spent at the bottom of the water garden, and yet he responded just as he had done all last year. Thought you would enjoy this. . . ." Later, he replied to my note asking if I could quote from his letter "Yes, you can quote me. It gets even better—today I fed four frogs, and two of them really `got into it' with each other, jostling each other in order to be first in line for their worm. It is as if winter never happened—they are lining up for their afternoon `treat' just like they did all last summer. Simple pleasures. . . . Pete"

A lifetime to master

Taxonomy, the relationship among living species as defined by *Homo sapiens*, has just burped out a massive change to the nomenclature of the amphibian species of the world. Darrell Frost of the American Museum of Natural History and colleagues have published a massive online paper which details all the changes which resulted from DNA studies and other information about 522 species of amphibians. Frost said, "The new amphibian tree of life shows that the taxonomy up to this point has been hopelessly flawed and provides us with a new taxonomy that offers the scientific community a new starting place from which to address questions about amphibian biodiversity." Several other people have said, "Wait and see if it stands up." But knowing Darrell and his careful work and lifelong devotion to the taxonomy of amphibians, I rather suspect it will, meaning I'll have dozens of new names to translate and a book to rewrite! [*LiveScience*, April 19, 2006, from Wes von Papineäu]

All for us, less for you

"Secretary of the Interior Gale Norton and Secretary of Agriculture Mike Johanns announced that approximately 191,800 acres of wetlands were gained between 1998 and 2004, bringing the nation's total wetlands acreage to 107.7 million acres, or 5 percent of the land area of the lower 48 states. The net gain was achieved because increases in shallow-pond-type wetlands offset the continued, but smaller, losses in swamp and marshland type wetlands. This report shows a loss of 523,500 acres of swamp and marsh wetlands and a gain of

715,300 acres of shallow-water wetlands, . . . " according to the April 20, 2006, *Sacramento Bee* which continued: "[In California's Red-legged Frog critical habitat] ranchers and frogs can peacefully coexist, and [Fish and Wildlife] offered support for the ranching exemptions." Others criticized the proposal for reducing the amount of land for the frogs which were common in California until the gold rush began. Contributor Teri Radke wrote, "Maybe the frogs could get some of Emperor Norton's new `wetland acres.' [But] they might need to dodge a few golf balls and enjoy the fine bouquet of lawn chemicals."

Torquemada lives in Florida

(Do not blame me, this is a quote!) "Iguanas are not human. They do not deserve humane treatment," [Florida] resident Richard Zellner wrote [to his local newspaper]. "As far as I am concerned, they can be burned, shot and mutilated." The reaction from the impacted Florida Humane Society has not yet been sent, although this one excited several people to send copies including Marybeth Trilling, Wes von Papineäu, Ms. G. E. Chow and Bill Burnett, who noted this is the "same attitude as `the only good alligator is a dead alligator,' i.e., typical snowbirds."]

Green Wasabi (for foregoing remark)

Some beautiful writing from Ron McAdow, a Daily News Correspondent for *MetroWest* [May 2, 2006] As a child, I associated toads with fireflies and the happiness of warm summer twilights. That's becace, during the perfect time when lightning bugs twinkle in the deepening dusk, a silent, clod-shaped creature hopped into view on sun-warmed concrete and brought himself to my attention. Few wild vertebrates give kids a close-up look at themselves, but toads will. Survival-wise, they can afford to, because they exude a toxic slime that makes them bad eating. If you don't put them into your mouth or rub their juices into your eyes, toads are harmless. But silent they are not. . . . In the spring, American toads move to ponds where male toad-choirs fill the air with a sweet high-pitched trilling, a cheery sound that does not correspond with their drab appearance. Seated in water up to their shoulders, the musicians inflate the skin beneath their chins to the size of a decent bubble-gum bubble and emit a pleasant warble that draws other toads of both sexes. . . . The eggs, laid in shallow water in gelatinous strands, hatch in a week, more or less, depending on conditions. Toad tadpoles eat algae and grow for a month or two before lungs take over from gills and the toadlets move to dry land. These miniature toads disperse to forests and fields, catching and swallowing as many little bugs and worms as they can. The luckiest, fittest individuals grow to the fist-sized hoptoads we see on summer evenings. Gardeners love toads. To encourage toads to keep night-watch on their plants, some gardeners provide shady daytime retreats. Suppliers of horticultural accessories offer ceramic toad houses featuring gnomes or other whimsical motifs. In comparison to their jazzier-looking relative the frog, toads are homely. In color and texture toads resemble dirt. Their bellies are round and their propulsion feeble; they lack the spring-loaded leaping gear that gives frogs such sudden mobility. Yet toads don't seem self-conscious about their appearance or dissatisfied with their abilities. Maybe amphibian pride in their springtime chorus enables toads to hold their heads high the rest of the year. On warm spring days, listen for their music from a shallow pond near you." Thanks, Ron, for such a lovely toad story!

Exotics naturalized

Bill Burnett sent an original copy of the article from the *Orlando Sentinel*, March 13, 2006. The story, titled "It's a Jungle Out There: Exotic species make themselves at home in Central Florida" provides a what's what of species which have naturalized in the Seminole State including the monk parakeet, bullseye snakehead fish, feral pigs, Cuban treefrog, nutria, armadillo, coyote, variable platyfish, walking catfish, giant toad, common carp and rhesus monkeys. To which should of course be added: Humans, rats, mice, roaches, goats, chickens, domestic turkey, domestic dogs, and so-called domestic felines, Cuban anoles, and the omnipresent European rock dove, occasionally called the "pigeon." The Florida Fish and Wildlife Conservation Commission plans an amnesty day for people to turn in unwanted pets. This is hoped to reduce the number of exotics released into the wild where they eat what they should not and compete with native animals for limited and dwindling habitat. Meanwhile a slightly more hysterical article about giant pythons in Florida gives a long list of how pythons can inappropriately affect the environment and quotes a biologist with Florida Everglades National Park. "Last year, we caught 95 pythons," he said, not counting the one that exploded after trying to eat an alligator, or the two which got loose. One ate a pet cat, the other a turkey! A case of the non-native eating only non-native food items and therefore not competing with any large native predators. Closer to homes in suburbia and almost urbia, Miami-Dade's snake team catches around 20 pythons a year. The most interesting was a 15-footer which stopped traffic; rather like a scaly log-fall across the road. One state representative wants to add pythons to the Florida list of regulated reptiles. So while the pythons eat and breed out in the steamy swamps, the legislators sit in air-conditioned comfort and bat the bill around in committee. It could become law this year; or then perhaps it might not. Stay tuned. [Associated Press, April 12, 2006, from Ray Novotny]

Iguana eat you out of house and home

Just a few days later, many newspapers used the Associated Press story titled "Iguanas overrun island on Florida's Gulf Coast." In just 30 years, the resort town of Boca Grande has become infested with black spiny-tailed iguanas, yet none of the locals has so far started a business of capturing them and selling them in Asia as a cure-all or the next hot pet in Europe. Oh, sorry. That wasn't in the story. Let me pick it back up. "Lee County commissioners agreed to create a special tax for Boca Grande to cover costs of studying the infestation on the barrier island of Gasparilla, where scientists estimate there are up to 12,000 iguanas on the loose, more than 10 for every year-round resident." That's right, folks. Protein on the loose and all the government can think of is taxes. The local hardware store owner is more in touch. He said, "For some people, they've really taken over, climbing into attics, into vents and even into their toilets." He sells lots of traps. The gov-

ernment has had this item on its agenda before. In 1988, a mere 18 years ago, people suggested rounding up the lizards, but many people thought they were "kind of cute," according to a County Commissioner who added, "They're no longer cute little guys. They're very pesky. They eat turtle and bird eggs and burrow into sand dunes. We could lose a lot of sand in a storm." The article added that, "The iguana was introduced to Boca Grande in the 1970s by a boat captain who brought a few from Mexico for his kids but released them when they grew too large. Their population exploded because each female iguana can lay up to 75 eggs a year. The reptiles are found in a few other places in Florida, but nowhere in the numbers seen on Gasparilla Island, home to television renovator Bob Vila and a vacation spot for the Bush clan." [*Arkansas Democrat-Gazette*, April 16, 2006, from Bill Burnett and the *Lansing State Journal*, April 15, 2006, from Jim Harding] Contributor Jim Harding writes: I always like to ask a `what if' question in these circumstances. Like what if the iguanas had gotten there [by themselves] . . . rafting or something? Would they still be so undesirable? Are humans completely separate from nature or a `natural' method of dispersal? Always or never? These questions always elicit great discussions in my herp class! Cheers. Jim"

My two cents

I've always wondered why we try to eradicate vertebrate species that successfully translocate and take into captivity species declining in their native habitat when neither action seems particularly to "help or hurt" the great scheme of Nature. When viewed from a geological time scale, the glaciers ebb and flow, the bands of habitat suitable for species moves constantly up and down a temperature gradient like a vertebrate Gallileo's thermometer. Our houses and roads are just getting in their way. If Caribbean lizards are moving to Florida it may be because they know sea level is rising and they're the first to move on from the sinking islands of Atlantis.

Small lizard, big range extension

Although they were native to the Caribbean, during the 1940s, 20 pairs were released on Florida's Palm Beach island. They reached the mainland in 1968; by 2002 their range stretched nearly 60 miles of human habitat. Seems the little guys like concrete and houses for living spaces and they eat just about anything that fits in their mouths, including other lizards. [*Chicago Tribune*, May 1, 2006, online] One can only hope they eat their way through the Cuban anoles before becoming food for some other introduced beast.

Even worse in slo' mo'

The widely circulated gross-out video titled "Snake Regurgitates Hippo" is a real film, but the prey item is a tapir. Besides being native to a different continent from anacondas, hippos have four toes on the hind leg; tapirs have three. Count them for yourself. Google the title and it will come right up! [Thanks to Wes von Papineäu and Matt NoLastName for the video and Rodrigo de Souza for the prey ID.]

Far too many crocodiles

A man was caught in South Africa with 1,067 baby crocodiles in his car. That's either really small babies, really tightly packed, or a really big car. The visual image rather boggles the imagination. The police said, "The man faced charges of possession and transport of the crocodiles without the necessary permits," and that there was no information about where the babies had come from. *HerpDigest* [March 17, 2006] continues, "Recent figures from the international police agency, Interpol, showed that trade in flora and fauna was now the second largest illegal trade in the world, after narcotics. Recent estimates for the illegal flora and fauna trade put the figure at $US20 billion a year." [from Allen Salzberg]

The best-laid plans

According to officials at the San Diego Zoo, seven mountain yellow-legged frogs, collected in the San Bernardino Mountains in an effort to save the species, have died from a bacterium related to tuberculosis. The corpses of the female and six males will be studied to determine the actual cause of the deaths which took place over several days. [Associated Press, April 26, 2006, from The Center for North American Herpetology http://www.cnah.org]

The tip of the iceberg

One time I asked my correspondent Chuck Bogert how it felt to have a creature as delightful as the Guatemalan beaded lizard (*Heloderma horridum charlesbogerti* — found in 1984) named for him in 1988. You could almost hear his growl when his letter arrived. "Primitive lizards for primitive people," he wrote and pointed out they had become extinct anyway. And just a few years later, despondent over failing health, he took his own life. Ten years afterwards, in 2002, a few individuals were found in small desert patches in the Motagua Valley in Guatemala surrounded by rain-forested valleys and cloud-forested mountains. People, of course, live here, farming corn, tobacco and melons in the well-drained formerly desert soil. Due to myths most beaded lizards were killed on sight by local people until they found out they could make more money selling them to international animal dealers. Scientists speculate that habitat loss and removal for trade have pushed the species to the edge; about 200 are believed to exist in the wild. Lately education and conservation people have worked with locals to stop the wanton killing of this unique creature. The usually quite significant proceeds from this year's National Reptile Breeder's Expo will go to "Project Heloderma." If you'd like to send auction items, please address: Wayne Hill, 621 Avenue M, SW - Winter Haven, FL 33880 Attn: Project Heloderma. Cash donations to "Project Heloderma" c/o Brad Lock, Zoo Atlanta, 800 Cherokee Avenue, SE, Atlanta GA 30315 "block@zooatlanta.org". [Press Release, May 2, 2006]

The bottom of the iceberg

The Associated Press reported on May 2, 2006: "Polar bears and hippos are among more than 16,000 species of animals and plants threatened with global extinction, [said] the World Conservation Union. . . . According to the Swiss-based conservation group, known by its acronym IUCN, the number of species classified as being in serious danger of extinction rose from about 15,500 in its previous `Red List' report, published

in 2004. The list includes one in three amphibians, a quarter of the world's mammals and coniferous trees, and one in eight birds" and the rate at which it is happening is "increasing, not slowing down,'' said ... the conservation group's director general." The full report is available on the net at "http://www.iucnredlist.org." [From Jim Harding]

Take my skin, please!

A new book is out on how to tell which snake has left its skin behind. Sound silly? It's not. There's sound science behind it. "The ability to make such identifications may greatly increase the number of vouchered records of snakes throughout the eastern United States and adjacent Canada, and may provide a source for additional tissue samples for molecular research on these reptiles, all without the necessity of removing a serpent from its natural environment. . . . With the publication of this title, The Center for North American Herpetology is pleased to initiate its monograph series, produced and published in cooperation with Eric Thiss of Serpent's Tale & Zoo Book Sales. The CNAH monographs are designed to make available herpetological work about North America and adjoining countries in order to better serve the academic community. . . . CNAH is a nonprofit 501c3 foundation devoted to promoting the preservation and conservation of North American amphibians, turtles, reptiles and crocodiles through education and information. For more information about CNAH, visit . . . http://www.cnah./org. To see or order the book, contact Serpents Tale 507-467-8733 or http://www.zoobooksales.com." [April 26, 2006, The Center for North American Herpetology, from Joe Collins]

Sounds like a B-movie plot, crocs in a canal

A crocodile farm in Thailand scared half its neighbors to death while the other half caught 12 escaped crocodiles that slipped out of the farm despite local people's calls for stricter regulation of the enterprise. A 24-year-old fisherman was bitten by one of the crocs; another dozen remain to be captured. Officials said they had to catch them now, while the water level is low, for they could go anywhere once the rains start again. [Associated Press, April 20, 2006, from Ms. G. E. Chow]

Ancient walking snake

Following the widely announced "Jurassic Mammal," now comes "A Cretaceous terrestrial snake with robust hind-limbs and a sacrum," according to *Nature* [440, 1037-1040 April 20, 2006, from Mike Dloogatch] which continues: "It has commonly been thought that snakes underwent progressive loss of their limbs by gradual diminution of their use. However, recent developmental and paleontological discoveries suggest a more complex scenario of limb reduction, still poorly documented in the fossil record. Here we report a fossil snake with a sacrum supporting a pelvic girdle and robust, functional legs outside the ribcage. The new fossil, from the Upper Cretaceous period of Patagonia, fills an important gap in the evolutionary progression towards limblessness because other known fossil snakes with developed hindlimbs, the marine *Haasiophis, Pachyrhachis* and *Eupodophis*, lack a sacral region. Phylogenetic analysis shows that the new fossil is the most primitive (basal) snake known and that all other limbed fossil snakes are closer to the more advanced macrostomatan snakes, a group including boas, pythons and colubroids. The new fossil retains several features associated with a subterranean or surface dwelling life that are also present in primitive extant snake lineages, supporting the hypothesis of a terrestrial rather than marine origin of snakes."

From the Sports Section

Apparently a team with attendant sports writers was going from someplace to somewhere and the writer starts writing what he saw. "So the plane . . . is sitting on the ground in Orlando when suddenly someone mentions that there's a frog on board. Seems a young man had brought a rather large frog on the plane in a cup with no lid, and said frog was a major concern. Flight attendants told family members the frog had to go, and they refused. So the pilot called the Orlando police in. That's right, the police. For a frog. The police officer went to the back of the plane where the offensive frog had taken residence and informed the family either the frog had to go, or it had to get off. Me, I like frogs and all, but given the way airlines treat customers these days and given the cost of flying six folks from Orlando to Cleveland, I'd sacrifice the frog. Perhaps send it to a better place or something. Well, this family got up and left the plane—all six of them! All the while, they murmured how unfair it was that this frog could not fly to Cleveland. So in a day and age when airlines will not hold a connection if your flight is 10 minutes late, this major airline that flies direct between Orlando and Cleveland held a flight for 20 minutes to rid it of an offensive frog. With six folks having to find a new way to get to Cleveland, I figure that was at least a $1,000 frog." [*Akron Beacon*, April 6, 2006, from Ray Novotny]

Snakes in Movies

From the *Chicago Tribune*'s spirited writer Monty Phan comes this partial Filmography of Snakes:

- *Snake People* (1971) - Voodoo island death cult transforms native babes into zombies, who are then taught by a snake dancer to kill and devour police who try to bust up the ritual.

- *SSSSSSS* (1973) - College lab assistant falls for his mad-scientist boss's daughter—even as dad plots to turn the unlucky lad into a king cobra with his extra-special serum.

- *Raiders of the Lost Ark* (1981) - In which Indy, facing a pit of asps, reveals one of his few fears, uttering: "Snakes. Why'd it have to be snakes?"

- *Cobra* (1986) - OK, this only sounds like a snake flick. If only. Instead, we get Sylvester Stallone playing police Lt. Marion "Cobra" Cobretti in a film that bore the tagline, "If crime is the disease, Cobra's the cure."

- *From Dusk Till Dawn* (1996) - Salma Hayek dancing onstage in a bikini. Not sexy enough? How about also wrapping her in a giant snake?

- *Anaconda* (1997) - Great title, forgettable thriller—with a cast including Jennifer Lopez and Owen Wilson, who likely would be happy to put it far behind them (neither was in 2004's pointless sequel).

• *Harry Potter and the Chamber of Secrets* (2002) - Harry, who speaks the language of snakes, battles a giant basilisk in the film's climax.

• *Kill Bill: Vol. 2* (2004) - Bud (Michael Madsen) is done in not by the Black Mamba (Uma Thurman) but by a black mamba.

And coming soon to your multiplex, *Snakes on a Plane* (2006, August) The star, "Samuel L. Jackson . . . plays an FBI agent escorting a federal witness from Hawaii to Los Angeles when an assassin lets loose the serpents. `It's just one of those popcorn kind of moments, where you know you're going to a movie, you don't have to think about what's happening,' Jackson told NPR recently. `You know what's going to happen. There are going to be snakes loose on this plane. Some people are going to be bitten. There are going to be some victims.'" Meanwhile it's a blog-lander's delight. And meanwhile we can roll around what is sure to be the buzz-phrase of the movie on par with the specific odor of napalm at dawn, "Get these (expletive deleted) snakes off the (expletive deleted) plane." [*Chicago Tribune*, April 13, 2006] Just once, I'd like to see a *Gentle Ben* starring Annie Anaconda, or a *Lassie* starring Pythagoras the Python. How about *Life with Massasauga*, or for collectors *A Boelen's Python Named Desire*?

Thanks to everyone who contributed this month and to: Ms. G. E. Chow, Bill Burnett, Raymond Novotny, Ray Boldt, Wes von Papineäu, Lori King, Charlie Painter, Gabe Sereno and others whose letters and clippings await June! You can contribute, too. Send articles by mail to me at POB 1125 Ferndale, CA 95536-1125 or by email (text versions with link to source preferred) to ebeltz@ebeltz.net. And then wait 30 to 60 days to see "Your Name Here." And a great big thanks to you, too!

Unofficial Minutes of the CHS Board Meeting, April 14, 2006

Rich Crowley called the meeting to order at 7:30 P.M. All board members were present.

Officers' Reports

Recording Secretary: Zorina Banas read the minutes of the March 10 board meeting. The minutes were accepted as read.

Treasurer: Andy Malawy distributed the March financial reports. Preliminary information was included regarding ReptileFest. Andy expects to issue the final report at next month's board meeting.

Membership Secretary: Deb Krohn reported that membership is 572. The CHS received a request from Zoological Record in the United Kingdom for a complimentary review copy of the *Bulletin* each month. Mike Dloogatch moved to establish Zoological Record as an Exchange Member of the CHS. Linda Malawy seconded. The motion was approved unanimously. Deb suggested that the CHS look into having an easily portable membership display board professionally made by a graphic designer. Deb will look into that and bring a specific proposal to the board next month.

Corresponding Secretary: Cindy Rampacek mentioned that the Chicago Park District would want the CHS to have live animals on display every day if we are going to exhibit at Garden in a City. Cindy explained to them that the CHS probably could not commit to that request. Cindy mentioned that she would bring this up to the board and get back to them. The board agreed it would not be practical.

Sergeant-at-arms: Betsy Davis reported that there were 60 members at the March general meeting.

Committee Reports

Shows: Peggy Notebaert shows will be April 22–23, and May 6–7. Rich Crowley suggested putting the dates of our shows on the website calendar. At this time the CHS does not have a final contract with the Chicago Park District. Bob Bavirsha will be at the "See You Later, Alligator" show in Lockport June 24.

ReptileFest: The board would like to thank everyone who helped make this year's ReptileFest a huge success. Thank-you to all the teenagers for all of their tireless work. Thank-you to all of the veterinarians for taking time out of their busy schedule to answer questions about herp health. Thank-you to all CHS members for all of their hard work and commitment to the organization. Thank-you to all the nonprofit organizations that made this year's ReptileFest educational for everyone. Thank-you to all the vendors for their participation and for selling great herp products. Thank-you to all the great rescue groups for their dedication and tireless work in educating the public about reptiles. Thank-you to Mike Dloogatch and Deb Krohn for their hard work at the membership table. Thank-you to Linda Malawy, John Archer, Grace Archer, her helpers, and Bob Brverton for their work at the herps of Illinois exhibit. Thank-you to Rob Carmichael and his assistant Brian, from the Lake Forest Wildlife Discovery Center for educating the public about massasauga conservation. Thank-you to Erik Williams and Zoe Magierek for organizing the scavenger hunt again this year. Thank-you to the Bavirshas for setting up the tables, trees, alligators and giant snakes. Thank-you to Andy Malawy and his helpers for manning the register. Thank-you to all our great speakers. Thank-you to Marybeth Trilling for all of her hard work. Thank-you to Jim Nesci for taking time from his busy schedule to display his awesome animals at ReptileFest. Thank-you to the hard working photographers at this year's photo booth; it was a big success. Thank-you to all the herpetological organizations from other areas that participated this year and helped make ReptileFest successful. Thank-you to the Spitzers for their enthusiasm, hard work and staying with the herps overnight. Thank-you to all the new CHS members that exhibited this year. Thank-you to John Bailey and everyone who helped behind the scenes. Thank-you to Kyle, Doug and all of the staff at UIC for all of their help. Thank-you most of all to Jenny

Vollman, whose hard work and dedication made this year's ReptileFest possible.

Monthly Raffle: Linda Malawy will coordinate the raffle for the month of April.

Adoptions: Linda Malawy reported on expenses and funds that came in for adoptions for the month of March.

Old Business

Vet list: Cindy Rampacek has begun sending letters to the veterinarians.

Shedd: Rich Crowley asked if anyone with a handleable lizard would be interested in doing public appearances to help the Shedd Aquarium promote their "Lizards" exhibit.

New Business

Chicago Wilderness: Rich Crowley mentioned that Chicago Wilderness has invited the CHS board members to their annual member's night. RSVP is requested.

Rich Crowley brought up the need to renew the directors' and officers' liability insurance. Linda Malawy said that she will look into that and get two bids. Rich Crowley made a motion to approve the lower of the two bids for board of directors liability coverage. Linda Malawy seconded the motion. The motion passed unanimously.

Mike Dloogatch mentioned that all correspondence to the CHS should be sent to 2430 Cannon Drive, not to board members' private residences.

Roundtable

Andy Malawy mentioned that a child supposedly was bitten at ReptileFest. No board member had knowledge of this.

Mike Dloogatch mentioned that babies of an African caecilian species have been found to feed off of the mother's skin.

Linda Malawy thanked Jenny Vollman on behalf of the board for all of her hard work and dedication to the CHS and for pulling off another successful ReptileFest.

Jenny Vollman and the rest of the board send heartfelt congratulations to John and Stacey Bailey for the birth of their captive-bred baby boy Paul Bailey.

Zoe Magierek suggested having the scavenger hunt on the hand-out map for ReptileFest 2007.

Mike Scott suggested doing more shows to promote the CHS.

Bob Bavirsha thanked everyone for all of their hard work.

John Archer mentioned that the Bavirshas deserve a lot of credit for all of their hard work.

Rich Crowley mentioned that the 'Fest was very successful and thanked everyone for all of their hard work.

The meeting was adjourned at 9:20 P.M.

Respectfully submitted by Zorina Banas, Recording Secretary

Herpetology 2006

In this column the editorial staff presents short abstracts of herpetological articles we have found of interest. This is not an attempt to summarize all of the research papers being published; it is an attempt to increase the reader's awareness of what herpetologists have been doing and publishing. The editor assumes full responsibility for any errors or misleading statements.

CAECILIAN PARENTING

A. Kupfer et al. [2006, Nature 440:926-929] note that although the initial growth and development of most multicellular animals depends on the provision of yolk, there are many varied contrivances by which animals provide additional or alternative investment in their offspring. Providing offspring with additional nutrition should be favored by natural selection when the consequent increased fitness of the young offsets any corresponding reduction in fecundity. Alternative forms of nutrition may allow parents to delay and potentially redirect their investment. The authors report a remarkable form of parental care and mechanism of parent–offspring nutrient transfer in a caecilian amphibian. *Boulengerula taitanus* is a direct-developing, oviparous caecilian, the skin of which is transformed in brooding females to provide a rich supply of nutrients for the developing offspring. Young animals are equipped with a specialized dentition, which they use to peel and eat the outer layer of their mother's modified skin. This new form of parental care provides a plausible intermediate stage in the evolution of viviparity in caecilians. At independence, offspring of viviparous and of oviparous dermatotrophic caecilians are relatively large despite being provided with relatively little yolk. The specialized dentition of skin-feeding (dermatophagous) caecilians may constitute a preadaptation to the fetal feeding on the oviduct lining of viviparous caecilians.

VISUAL SIGNALING BETWEEN MALE FROGS

W. Hirschmann and W. Hödla [2006, Herpetologica 62(1): 18– 27] report that during intraspecific interactions involving males, females and subadults, acoustic as well as visual signals were observed in the diurnal frog *Phrynobatrachus krefftii*. Strikingly, interactions between adult males are highly dominated by inflations of the bright yellow subgular vocal sac without sound production. The authors studied the signaling behavior in males of *P. krefftii* at the Amani Nature Reserve, Usambara mountains, Tanzania, from November 2001 to March 2002. Under nonmanipulated conditions, 641 male–male interactions were registered, involving 31 individuals, during 323 hours of observation. Most (496 or 77%) inflations of the vocal sac were purely visual; the remainder (145 or 23%) of the signals were accompanied by sound production. To test whether exclusive visual signaling can be evoked under experimental conditions, tethered males were introduced into the visual field of 28 residents, and the elicited responses were recorded over 10 minutes after the introduction. Purely visual signals (825 out of 1106) dominated over vocal-sac inflations accompanied with sound production. In seven selected focal males, the rate of exclusive visual signaling (0.57 signals/min), however, was more frequent than under nonmanipulated conditions (0.13 signals/min). *Phrynobatrachus krefftii* is the first species of anuran reported to perform nonaudible vocal-sac inflations during intraspecific male– male signaling behavior.

BROWN BASILISKS IN FLORIDA

K. L. Krysko et al. [2006, Iguana 13(1):25-30] report that the brown basilisk (*Basiliscus vittatus* Wiegmann 1828) is the only established representative of the family Corytophanidae in Florida. Until recently, the only reported populations of *B. vittatus* in the United States were in the southeastern Florida peninsula from northern Miami-Dade County and adjacent Broward County to the north. This study documents likely modes of introduction of this species in Florida and illustrates range expansion as far south as Homestead, as far north as St. Lucie County, and as far west as Collier County.

GASTROINTESTINAL FERMENTATION BY SIRENS

G. S. Pryor et al. [2006, J. Herpetology 40(1):112-117] report that the nutritional ecology and digestive physiology of salamanders in the family Sirenidae remain poorly understood. Although the intestinal contents of these salamanders include herbivorous dietary items, the nutritional significance of such ingested matter is unknown. This study examined gut contents, gastrointestinal structure, and microbial fermentation in wild-caught greater sirens (*Siren lacertina*). Ingested items included aquatic invertebrates, vascular plants, and algae. The guts of these amphibians were not as voluminous or morphologically specialized as in many herbivores, but the posterior intestine was enlarged and exhibited a distinct folding pattern and an ileocolonic valve that may help maintain a symbiotic microbial population. Active microbial fermentation was indicated by relatively high levels of short-chain fatty acids in the medial-posterior and posterior gut regions. This is the first account of gastrointestinal fermentation in the family Sirenidae and only the second account in the class Amphibia.

LIZARD FORELIMB WAVE DISPLAYS

M. Halloy and M. Castillo [2006, Herpetological Natural History 9(2):127-133] studied forelimb wave displays in 11 species of the Neotropical lizard genus *Liolaemus*. These species belong to two main groups within this genus, based on morphology and molecular studies. All species performed one or two types of forelimb wave displays. In the one-forelimb wave display, a single foreleg was raised one or more times while the lizard remained standing upright on two front legs or on all four. In the more complex two-forelimb wave display, the lizard, lying flat on the substrate, performed a simultaneous circular movement of the two front limbs followed by alternate motions of each forelimb. Significant differences were found between species of the two main groups with respect to the number of waves per bout and the duration of waves. The one-forelimb wave display, associated with an upright body posture, may signal an assertive and/or challenging lizard. The two-forelimb wave display, on the other hand, may indicate relative arousal of the lizard, conflict, or possibly could serve as an appeasement signal.

Advertisements

For sale: rats and mice—pinkies, fuzzies and adults. Quantity discounts. Please send a SASE for pricelist or call Bill Brant, *THE GOURMET RODENT*, 6115 SW 137th Avenue, Archer FL 32618, (352) 495-9024, E-mail: GrmtRodent@aol.com.

For sale: from **The Mouse Factory**, producing superior quality, frozen feeder mice and rats. We feed our colony a nutrtionally balanced diet of rodent chow, formulated especially for us, and four types of natural whole grains and seeds. Mice starting from: pinks, $.17 each; fuzzies, $.24 each; hoppers, $.30 each; weanling, $.42; adult, $.48. Rats: starting with pinks at $.45 each, to XL at $1.80 each. Discount prices available. We accept Visa, MC, Discover or money orders. PO Box 85, Alpine TX 79831. Call **toll-free** at (800) 720-0076 or visit our website: < http://www.themousefactory.com> .

For sale: **high quality frozen feeders**. Over a decade of production and supply. Seven sizes of mice availabe: small newborn pinks up to jumbo adults. Prices start at $25 per 100. Feeders are separate in the resealable bag, not frozen together. Low shipping rates. Free price list. Kelly Haller, 4236 SE 25th Street, Topeka KS 66605, (913) 234-3358 evenings and weekends.

For sale: herp books. *Sssimply Snakes* by Rob Bredl, 1993, 25 pp., many b&w photos, deals with Australian snake identification, softbound, $20; *The Real Crocodile* by Rob Bredl; 1993 (?), 32 pp., many b&w photos, author's experiences with and attitudes towards crocodiles, softbound, $20 (Rob and herpetologist father Joe have operated fauna exhibits in Australia for many years); *Maintenance of Rattlesnakes in Captivity* by James Murphy and Barry Armstrong, 1978, 40 pp., no photos, lower left corner of cover and first few pp. creased, otherwise, excellent cond., softbound, $40; *The Herpetology of the Port-Au-Prince Region and Gonave Island, Haiti. Parts I-II* by Ernest Williams, Benjamin Shreve and Philip Humphrey, 1963, pp. 294-342, 5 b&w plates, softbound, $26; *A Check List of North American Amphibians and Reptiles* by Karl P. Schmidt, 6th ed., 1953, 280 pp., published by ASIH, hardbound, $10. All publications in excellent condition except as noted. Postage $2.50 for orders under $25, free for orders of $25 or more. William R. Turner, 7395 S Downing Circle W, Littleton, CO 80122, (303) 795-5128, e-mail: toursbyturner@aol.com.

For sale: many aquariums from 10 to 75 gallons, call for prices, (708) 799-6697.

For sale: Four (4) 12- to 18-month-old crested geckos (at least one egg-laying female), various colors and patterns, with 31" tall Creative Habitats screen/glass tank and nice accessories. Also, 7-year-old leopard gecko in a 36" long glass tank plus accessories. Moving and just looking to recoup a portion of my costs. Chicago area only; pick up in western suburbs. Please call if interested. Chuck, (630) 986-5951.

For sale: c.b. '06 rare and unusual garter snakes. **Eastern**—normals $25 each/2 for $40, albinos (various bloodlines) $250, granite $150, het granite $75, melanistic $40, Florida $25 each / 2 for $40, flames $100, flame × albino $150 each / $275 pair, erythristics $100 each, erythristic × albino $150 each / $275 pair, snow (limited numbers) $395, paradox leucistic $450, possible hets $250– 300 pair. **Plains**—normals $25 each / 2 for $40, anerythristic $40, axanthic $75, albinos—2 strains $75, quad hets $75, Christmas albino $125, super Christmas albino $175, hybinos $195, snow—2 strains $95. **California red side** $125. **Wandering**—normals $25 each / 2 for $40, melanistic $95, het melanistics $45, chocolate $95. **Santa Cruz** $60. **Red-sided**—normals $25 each / 2 for $40, albinos $375, anerythristic $75, double het snow $225 pair. **Eastern black-necked** $95. **Blue-striped (*similis*)** $40. **Mesoamerican highlands**, $40. Scott, (919) 365-6120 EST, email sfelzersgarters@bellsouth.net, web address: www.gartersnakemorphs.com.

Herp Tours: Why pay more? Travel with the International Fauna Society, a 501 (c)3 not-for-profit organization, and experience the Costa Rican rainforest! Stay at the beautiful Esquinas Rainforest Lodge in the untouched herpetological paradise that is Piedras Blancas National Park. Meet new friends, relax in the naturally-filtered swimming pool or in the lush, fauna-filled tropical garden. Discounts for IFS and Chicago Herp Society members. For details, visit The International Fauna Society website at www.faunasociety.org or E-mail: info@faunasociety.org.

Herp tours: Adventure trips to **Madagascar**! Journey somewhere truly unique to seek and photograph nature on the world's least-studied mini-continent. For maximum herp fun and discovery, join Bill Love as we go where few people will ever venture in their lives. Let his experience assure a comfortable tour finding the most colorful and bizarre species on the planet! Get all the details at Blue Chameleon Ventures' comprehensive new website: < http://www.bluechameleon.org> , E-mail: bill@bluechameleon.org, or call (239) 728-2390.

Herp tours: The beautiful Amazon! Costa Rica from Atlantic to Pacific! Esquinas Rainforest Lodge, the Osa Peninsula, Santa Rosa National Park, and a host of other great places to find herps and relax. Remember, you get what you pay for, so go with the best! GreenTracks, Inc. offers the finest from wildlife tours to adventure travel, led by internationally acclaimed herpers and naturalists. Visit our website < http://www.greentracks.com> or call (800) 892-1035, e-mail: info@greentracks.com

Internship: The Kentucky Reptile Zoo, a nonprofit organization, seeks student interns for the 2006 season. The zoo is an educational exhibit, reptile breeding and venom research facility located near Kentucky's Red River Gorge and Natural Bridge State Park. The intern will assist in the captive maintenance of the zoo's reptile collection, collect admissions to the exhibit, give interpretive talks and interact with the public, assist with educational outreach programs, and perform other duties as assigned. In addition, the intern will be responsible for the completion of at least one research project related to the field of herpetology. The intern will *not* be involved in the handling of any venomous species. Desirable qualifications include a willingness to handle snakes and other reptiles on a daily basis, ability to communicate effectively with people, writing skills, orientation to details, and self-motivation. The intern will be required to work both Saturday and Sunday, with days off during the week. Students majoring in the biological or natural sciences are preferred. Interns are required to be either college students or recent graduates. Former interns have arranged for academic credit with their institutions. Benefits include experience with one of the most extensive and diverse collection of snakes in the U.S., housing and $55/week to cover expenses. Interns have been successful in finding zookeeper positions: over 95% hire rate! Personal transportation is recommended. A valid driver's license is required. Starting dates are flexible, but a minimum of 3 months covering fall (September– November) is required. Deadlines is July 1 for fall. To apply send a cover letter, resume, transcript, and at least 2 (preferably 3) references to: Kristen Wiley, Internship Coordinator, Kentucky Reptile Zoo, 200 L&E Railroad, Slade KY 40376. Or E-mail: kyreptil@pop.mis.net.

Reptile show: Wisconsin Reptile Breeders' Show and Sale, Saturday, April 22, 10 A.M. to 4 P.M., 1011 Nichols Road, Monona, Wisconsin. Captive-bred only. $4 admision, $2 under 12. Info: aor@chorus.net or (608) 238-2891.

Virtual Museum of Natural History at www.curator.org: Free quality information on animals—emphasis on herps—plus expedition reports, book reviews and links to solid information. Always open, always free.

Wanted: I'm looking for my soulmate. I want to settle down to a family before it is too late. But I have this problem. . . . When we get into hobbies and interests: old popular records, jazz and show tunes, and antique electronics are fine, but when I mention turtles, "What, are you crazy?" So maybe this is a better place to look. Please don't try to separate me from my turtles—at least not most of them. If interested, please drop a line to Ellis Jones, 1000 Dell, Northbrook IL 60062, telling a bit about yourself and giving a phone number.

Line ads in this publication are run free for CHS members—$2 per line for nonmembers. Any ad may be refused at the discretion of the Editor. Submit ads to: Michael Dloogatch, 6048 N. Lawndale Avenue, Chicago IL 60659, (773) 588-0728 evening telephone, (312) 782-2868 fax, E-mail: MADadder0@aol.com.

UPCOMING MEETINGS

The next meeting of the Chicago Herpetological Society will be held at 7:30 P.M., Wednesday, May 31, at the Peggy Notebaert Nature Museum, Cannon Drive and Fullerton Parkway, in Chicago. **Dr. William Griswold**, a veterinarian from Phoenix, Arizona, will speak on "Hiding in Plain Sight: Florida's Overlooked Herpetofauna." Many of the Sunshine State's rarest and most unusual reptiles and amphibians are little known to the average herpetologist. Dr. Griswold will share photographs, natural history vignettes and personal experiences from eighteen years of field herping from the farthest reaches of the Florida Panhandle to the southernmost point of Key West.

Our popular **Show & Tell** meeting will take place on June 28 this year. All members are encouraged to bring a favorite animal and to be prepared to come up on stage and tell us something about the animals they have brought.

The regular monthly meetings of the Chicago Herpetological Society take place at Chicago's newest museum — the **Peggy Notebaert Nature Museum**. This beautiful new building is at Fullerton Parkway and Cannon Drive, directly across Fullerton from the Lincoln Park Zoo. Meetings are held the last Wednesday of each month, from 7:30 P.M. through 9:30 P.M. Parking is free on Cannon Drive. A plethora of CTA buses stop nearby.

Board of Directors Meeting

Are you interested in how the decisions are made that determine how the Chicago Herpetological Society runs? And would you like to have input into those decisions? If so, mark your calendar for the May 19 board meeting, to be held at the North Park Village Administration Building, 5801 North Pulaski Road, Chicago. To get there take the Edens Expressway, I-94, and exit at Peterson eastbound. Go a mile east to Pulaski, turn right and go south to the first traffic light. Turn left at the light into the North Park Village complex. At the entrance is a stop sign and a guardhouse. When you come to a second stop sign, the administration building is the large building ahead and to your left. There is a free parking lot to the left and behind the building.

The Chicago Turtle Club

The monthly meetings of the Chicago Turtle Club are informal; questions, children and animals are welcome. Meetings normally take place at the North Park Village Nature Center, 5801 N. Pulaski, in Chicago. Parking is free. For more info call Lisa Koester, (773) 508-0034, or visit the CTC website: http://www.geocities.com/~chicagoturtle.

NOVEMBER CONFERENCE ON MEXICAN HERPETOFAUNA

The Mexican Herpetological Society and the Universidad Autónoma de Nuevo León (UANL) School of Biological Sciences are pleased to announce the Ninth Reunión Nacional de Herpetologí a México, November 6– 9, 2006. The meeting will be held in the Raúl Rangel Frí as Library, located on the campus of UANL, Monterrey, Nuevo León, México. Participation and attendance are open to all parties interested in the study of Mexican Herpetofauna. Papers/posters on Mexican herpetofauna systematics, biogeographic analysis, faunistics, ecology, conservation, divulgation, reproduction and development are welcome. For further information contact:
www.sociedadherpetologicalmexicana.com or www.fcb.uanl.mx.

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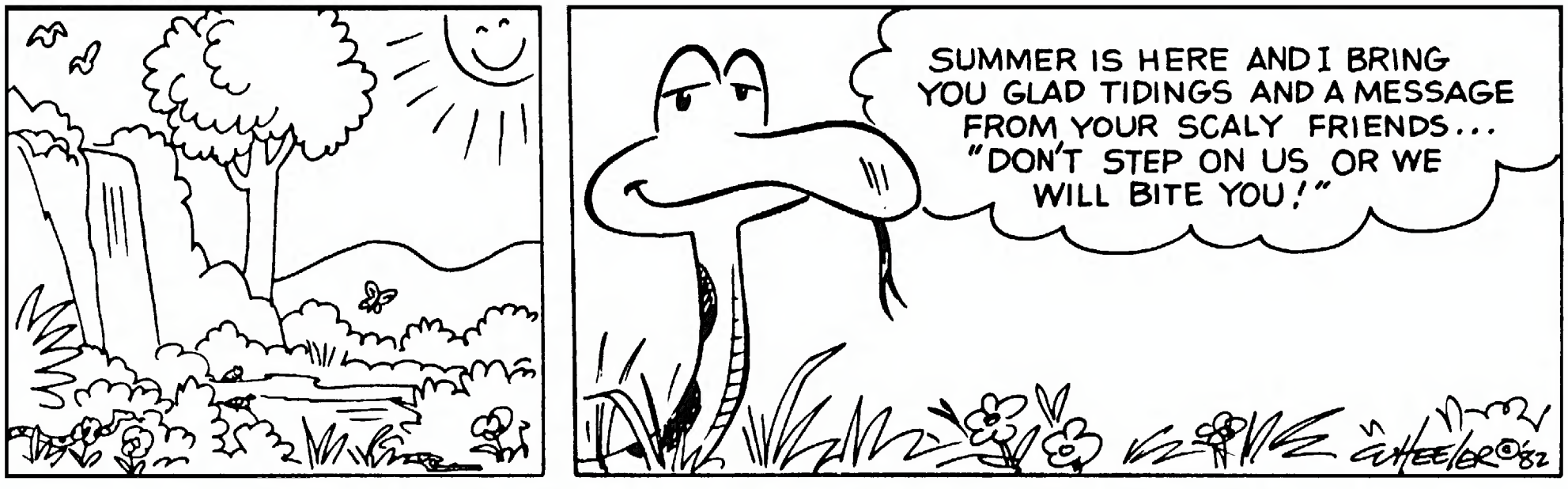

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